

AUTOMATIC BRAKING SYSTEM

Hemant Suryawanshi¹, Rohan Sarode²

¹Bachelor of Engineering, Dept. of Mechanical Engineering, G. H. Raisoni Institute of Engineering and Management, Jalgaon, Maharashtra, India

²Bachelor of Engineering, Dept. of Mechanical Engineering, G. H. Raisoni Institute of Engineering and Management, Jalgaon, Maharashtra, India

Abstract - An automatic Braking system is mostly an effective mechatronic system that has an Ultrasonic wave emitter provided on the front portion of a car producing and emitting Ultrasonic waves. An Ultrasonic receiver is additionally placed on the front portion of the car operatively receiving a reflective Ultrasonic wave signal. The reflected wave (detected pulse) gives the space between the obstacle and therefore the vehicle. Then a microcontroller is used to control the speed of the vehicle based on the detection pulse information to push the brake pedal and apply the brake to the car stupendously for safety purposes.

Key Words: Effective mechatronic system, Ultrasonic waves, Microcontroller.

1. INTRODUCTION

Automatic braking may be a safety technology that automatically activates the vehicle's brake, to the point, when necessary. Systems can vary from pre-charging brakes to slowing the vehicle to reduce damage. Nowadays, some advanced and updated systems completely take over and stop the vehicle before a collision happen. The precise capabilities of their car's automatic braking system. Regardless of a vehicle's autonomous technologies, drivers should remain conscious of their surroundings and maintain control in the least times. the automatic braking or brake assist is an integral component of crash avoidance technologies, including front crash prevention systems, back over prevention systems, and cross-traffic alert systems. Each automaker may have a special name for such technologies, but the rock bottom line is that the brake assist is supposed to attenuate accidents.

An automatic braking system is an important and crucial part of safe technology for automobiles. It is an advanced system, specifically designed to either prevent a possible collision or reduce the speed of the moving vehicle, prior to a collision with another vehicle, pedestrian, or an obstacle of some sort. These systems are a combination of sensors, such as radar, video, infrared, or ultrasonic to detect for possible objects in front of the vehicle, and then use brake control to

prevent collision if the object is, in fact, detected. Automatic brakes are one of many car safety features and are often integrated with other technology, such as pre-collision systems and adaptive cruise control.

1.1 WORKING OF AUTOMATIC BRAKING SYSTEM

Each carmaker has its own automatic braking system technology, but all of them believe some sort of sensor input. The ultrasonic sensor contains transmitter and receiver units, and the ultrasonic transmitter detects the obstacle by transmitting the signals and reflects back to the ultrasonic receiver unit. The ultrasonic sensor input is then used to determine if there are any objects present in the path of the vehicle. If an object is detected, the system can then determine if the speed of the vehicle is bigger than the speed of the thing ahead of it.

By which through Arduino dumped C Program the calculations will take place through PIC microcontroller according to the given maximum distance, and distance between the automatic system and obstacle.

The DC gear motor rotates uniformly at a set rpm and gradually decreases speed while automatically breaking the system through servomotor braking mechanism phenomena.

A significant speed differential may indicate that a collision is probably going to occur, during which case the system is capable of automatically activating the brakes.

2. COMPONENT IN AUTOMATIC BRAKING SYSTEM

There is mainly some component used in Automatic braking system:

- **Ultrasonic Sensor (transmitter and receiver)**
- **Microprocessor**
- **Electric motor (DC gear motor)**
- **Servomotor**
- **Braking system**

2.1 Ultrasonic Transmitter:

Before the ultrasonic transmitting wave, there is a part which is an ultrasonic wave generator that functions to create the ultrasonic wave. In that part, there is a timing instruction means for generating an instruction signal for intermittently providing ultrasonic waves. This signal will send to an ultrasonic wave generator for generating ultrasonic waves based on the instruction signal from said timing instruction means (transform electrical energy into a sound wave). After an ultrasonic wave was produced, the ultrasonic transmitter transmits the ultrasonic waves toward a road surface to find out the obstacle. The range that obstacle detected is depends on the range of ultrasonic sensors used.

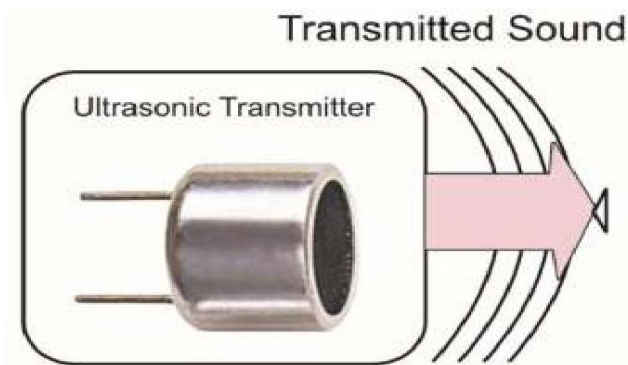


Fig -1: Ultrasonic Transmitter

2.2 Ultrasonic receiver:

Whenever the ultrasonic wave detects the obstacle, it produces a reflected wave. An ultrasonic receiver is employed for receiving the ultrasonic waves reflected from the paved surface obstacle to get a reception signal. There is an ultrasonic transducer that will transform back the sound wave into electrical energy. This signal amplified by an amplifier. The amplified signal is compared with a reference signal to detect components within the amplified signal thanks to obstacles on the paved surface. The magnitude of the reference signal or the amplification factor of the amplifier is controlled to take care of a continuing ratio between the types of the reference signal and therefore the average of the amplified signal.



Fig -2: Ultrasonic Receiver

2.3 DC GEAR MOTOR:

A DC gear motor may be a fairly simple electric gear motor that uses electricity, gearbox, and magnetic flux to supply torque, which turns the motor. At its most simple, the DC gear motor requires two magnets of opposite polarity and an electric coil, which acts as an electric magnet. The repellent and attractive electromagnetic forces of the magnets provide the torque and cause the DC gear motor to turn. A gearbox is present just after the DC motor and a rotary shaft are connected to it, with the help of this DC gear motor setup the vehicle wheels can be rotated in this project.



Fig - 3 DC Gear Motor

2.4 SERVOMOTOR:

The output shaft of the servo motor is capable of traveling somewhere around 180 degrees. A normal servo motor is employed to regulate an angular motion between 0 and 180 degrees, and it's mechanically unable of turning any farther thanks to a mechanical stop built onto the most output gear. The angle through which the output shaft of the servo motor needs to travel is determined according to the nature of the signal given to the motor as input from the PIC. Because of the rotation of the servomotor in 180 degrees, the brakes can be applied and released through the given brake's mechanism.



Fig - 4 Servomotor

3. Advantages:

- Discrete distances to moving objects can be easily detected and measured.
- Resistance to other disturbances such as vibration, infrared radiation, ambient noise, and EMI radiation.
- Measures and detects distances to moving objects.
- Impervious to target materials, surface, and color.
- Solid-state units have a virtually unlimited, maintenance-free lifespan.
- Detects small objects over long operating distances.
- Ultrasonic sensors cannot be affected by dust, dirt, or high moisture environments.

4. Disadvantages:

- Overheating of a wave emitter prevents from happening the energy of ultrasonic waves emitted therefrom being enhanced to a practical level.
- Interference between the projected waves and the reflected waves takes place, and the development of standing waves provides adverse effects.
- It is impossible to find out between reflected waves from the road surface and reflected waves from other places or objects.

5. CONCLUSION

This paper presents the implementation of an Automatic Braking System for forwarding Collision Avoidance, intended to use in vehicles where the drivers may not brake manually, but the speed of the vehicle is often reduced automatically thanks to the sensing of the obstacles. With this future study and research, we hope to develop the system into an even more recently developed speed control system for automobile safety, while realizing that this assuredly requires tons of work and learning, just like the programming and operation of microcontrollers and

therefore the automobile structure. We believe that the incorporation of all components in Automatic Braking System will maximize safety and also give such system a much bigger market space and a competitive edge up the market.

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